**EPA Region 6 Comments on EPA OIG Discussion Document:**
**EPA Air Monitoring Response to Hurricane Harvey[1]**

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**Audit Objective**

According to excess emission reports voluntarily filed by impacted facilities, Hurricane Harvey resulted in industrial facilities releasing an extra 418 tons of hazardous air pollutants into the air. These emissions were from accidents, facility shutdowns prior to the hurricane, and facility startups after the hurricane.

**Commented [BA1]:** Should qualify how this number is derived

**Commented [BA2]:** Is there a footnote qualifying what this specifically mean, and if it actually means HAPs or non-HAPs, how was the determination made?

*Air Quality Impacts of Hurricane Harvey*

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The health impact of these emissions was a concern to residents of communities living near these facilities who already experience chronic exposure to high levels of toxic air pollution. According to a study published in Environmental Science & Technology, the health impacts of direct and indirect particulate matter emissions from startup, shutdown and malfunction (SSM)[2] events in Texas was estimated to cost $148 million in 2015.

**Commented [BA3]:** This is stated as fact, and if so, should be footnoted with appropriate qualifications. If not, should perhaps be stated as residents of communities reporting or complaining that they were experiencing concerning levels of air pollution thought to be high levels of air toxins or as the claim was reported.

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*Industrial Makeup and Demographics of Houston Area Hit by Hurricane Harvey*

The Houston area is unique in that many residential communities are located next or close to industrial sources of air population. Due to the number and density of industrial sources in the Houston area and the proximity to residents, EPA assessments estimate an elevated health risk from exposure to air toxics for several census tracts within the greater Houston area. Generally, these communities are predominantly comprised of minority and low-income residents, sometimes referred to as environmental justice communities.

**Commented [CC4]:** In part due to the absence of zoning laws

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**Commented [BA5]:** Typo? If it intends to say pollution, I would suggest that it says "emissions."

**Commented [BA6]:** Should be footnoted to refer to information source.

*EPA Assistance Under the Stafford Act*

**Page 1, P6**

On August 25, the President declared a national disaster in Texas at the request of the Texas Governor. Such a declaration allows the Federal government to provide emergency response assistance to local emergency responders under the authority of the Stafford Act. The Federal government's response to a

**Commented [CC7]:** "to provide requested emergency response assistance..."

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disaster is guided by the National Response Framework (NRF) and the National Incident Management System (NIMS). The federal government plays a support role to local entities during disaster response; hence TCEQ was the lead agency for the Hurricane Harvey response.

**Commented [CC8]:** Should say, "plays a support role to state and local governments..."

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When the EPA responds to a federally-declared disaster it typically does so under the direction of the Federal Emergency Management Agency (FEMA) and by request of the state or states experiencing the emergency. To coordinate activities, a Unified Command was established between the EPA, the TCEQ, the General Land Office (GLO) of Texas, and the U.S. Coast Guard to oversee all emergency response efforts. This Unified Command was supported by three operational branches in Corpus Christi, Houston, and Port Arthur. The Emergency Operations Center (EOC) served as the EPA's emergency response operational focal point.

**Commented [CC9]:** EPA always responds to a federally declared disaster at the request of and under the direction of FEMA. In virtually all cases, FEMA initiates the response at the request of a state governor whose state is experiencing a disaster. An example of a rare exception would be the federal response to the Columbia Shuttle crash.

**Commented [CC10]:** The operational focal point is at the field command post of the Incident Commander who directs the operational activities of the three branches. The REOC is the focal point for implementation and tracking of overall management objectives for the response.

*Air Monitoring Conducted After Hurricane Harvey*

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After the storm, the EPA and the City of Houston used a variety of temporary monitoring methods to capture conditions around industrial sites. The EPA conducted flyovers of facilities with its contractor-owned ASPECT planes, screening pollutant plumes for potential hazardous releases near high priority industrial targets between August 31, 2017, and September 11, 2017. Other monitoring conducted by the Agency involved driving a bus equipped with TAGA technology throughout the impacted region between September 6, 2017, and September 20, 2017. In addition, monitoring was conducted after the storm by a firm under contract to the Environment Defense Fund.

**Commented [CC11]:** Most of the post-storm monitoring around industrial facilities referenced in this paragraph was for emergency response purposes. The purpose of emergency response air monitoring is to determine if there are conditions that pose an immediate threat to public health and the environment such as the type which may require local officials to make a shelter-in-place or evacuation decision. This is significantly different than the purpose of the ambient air quality monitoring.

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On September 6, the EPA and TCEQ told Houston communities that available data indicated that "local residents should not be concerned about air quality issues related to the effects of the storm." This was the only public press release that addressed air quality in general, while others addressed fuel waivers, water or superfund issues, and the Arkema explosion and fire.

**Commented [BA12]:** Someone commenting on this?

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On September 6, the EPA and TCEQ told Houston communities that available data indicated that "local residents should not be concerned about air quality issues related to the effects of the storm." This was the only public press release that addressed air quality in general, while others addressed fuel waivers, water or superfund issues, and the Arkema explosion and fire. In these joint Arkema-related press

releases, the EPA and TCEQ informed members of the public of the fire and chemical release at Arkema, assured them that they were monitoring the smoke and air quality, and advised them to limit their exposure by staying indoors with doors and windows closed and air conditioner running.

**Commented [CC13]:** See above comment. The primary focus of air monitoring immediately post storm was assessment of potentially acute exposures versus general air quality and press releases did include information regarding emergency response air monitoring.

**Scope and Methodology**

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To understand how and when air monitoring occurred, we collected and analyzed hazardous air pollutant data from several sources, including the EPA's Air Quality System (AQS), the EPA's TAGA bus and ASPECT aircraft, TCEQ's Air Emission Event Report database, the City of Houston, and Environmental Defense Fund/Entanglement. We compared this data to the AMCVs and AEGLs to identify any potential health impacts of Harvey-related air emissions. We also compared the location, timing and duration of the monitoring with reported excess emissions events to identify any potential data gaps in areas of elevated air emission releases. Finally, to understand the EPA's on-the-ground response and whether Harvey-related EPA communications were effective, we distributed a survey to 59 EPA staff who served as community liaisons during the response. We received 44 responses and analyzed this data.

**Commented [CC14]:** This is confusing as it appears to indicate a comparison of dissimilar data (acute short-term levels to chronic long-term levels).

**Commented [CC15]:** Would be most helpful to see survey results from local community members rather than EPA staff as the community is the target audience for this information.

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**Issue 1: Pre-Emergency Planning Could Improve Coordination of Air Quality Monitoring Efforts**

In response to the Hurricane Harvey disaster, NGOs, local governmental entities, and the EPA each supplemented the existing State or Local Air Monitoring Systems (SLAMS) network by collecting mobile ambient air monitoring data, with four distinct alternative monitoring efforts spanning twenty-one days of the disaster response period (August 31, 2017, through September 20, 2017). Despite the broad range of alternative monitoring efforts, this monitoring:

**Commented [CC16]:** Collection of ambient air monitoring data was not the focus of emergency response air monitoring.

- Did not coincide with most accidental or SSM-related Hazardous Air Pollutant (HAP) releases occuring during the disaster; and
- Was sometimes collected using inconsistent or inappropriate techniques. For example, an NGO collected samples over a duration too short to analyze whether the concentrations were harmful to human health.

**Commented [CC17]:** The Agency has no control over activities of NGOs.

*Monitoring Was Not Conducted During Most Excess Emissions Events*

Over half of all known abnormal HAP release incidents began while no monitors—stationary or otherwise—were operating. Companies in the Houston area reported over 319 tons of HAP releases due to Harvey-related SSM activities and accidental releases. However, most stationary monitors had already been turned off and secured when these facilities were shutting down their operations and when the first malfunctions began occuring.

**Commented [BA18]:** Should footnote information source.

**Commented [BA19]:** In the beginning of the paragraph it says no monitors were operating; here it says most monitors had been turned off. The two sentences are inconsistent with each other

Our comparison of these monitoring operating timelines to TCEQ's repository of self-reported SSM and accidental release data revealed most HAP release incidents began between August 23 and August 31, 2017—following TCEQ's disabling of its HAP SLAMS and prior to the EPA's first ASPECT flight response.

**Commented [CC20]:** The Agency has no control over when facilities initiate SSM activities.

Many of the HAPs releases were from storage tank leaks due to excessive rainfall and loss of electric power. The lack of data from either permanent or temporary monitoring during the time of the hurricane impedes drawing conclusions about the quality of the air in the period during and directly after the hurricane. For example, Valero Partners' roof tank failure—an incident that released an estimated 12.5 tons of HAPs, including benzene, hexane, and toluene—began on August 27, 2017 when all monitors were offline. The Arkema Crosby Plant explosion, another widely-publicized event, occurred September 1, 2017 when only one HAP SLAMS monitor was operational, and the EPA had just begun its ASPECT flights.

**Commented [CC21]:** Not clear what this means because sampling during the hurricane would not be feasible.

**Commented [CC22]:** About ambient air quality? There was air monitoring data to support emergency response operations.

Communities located close to industries faced an increased likelihood of exposure to HAP emissions during the emergency. For example, 38 percent of all known hazardous air emission incidents reported for Hurricane Harvey in the Houston area occurred fewer than four miles from the Harrisburg/Manchester neighborhood. These incidents disproportionately accounted for nearly 94 percent (a total of nearly 300 tons) of all known HAP emissions occurring in Harris County during the disaster, despite this region accounting for only 0.16 percent of the County itself.

**Commented [BA23]:** This may need to be re-stated to be clear – what is hazardous air emission, interchangeable with HAP, all HAP? Also non-HAP?

Communities located close to industries faced an increased likelihood of exposure to HAP emissions during the emergency. For example, 38 percent of all known hazardous air emission incidents reported for Hurricane Harvey in the Houston area occurred fewer than four miles from the Harrisburg/Manchester neighborhood. These incidents disproportionately accounted for nearly 94 percent (a total of nearly 300 tons) of all known HAP emissions occurring in Harris County during the disaster, despite this region accounting for only 0.16 percent of the County itself.

**Commented [CC24]:** Reported by?

**Commented [CC25]:** Is this calculation based on release estimates phoned in to the National Response Center or another source?

**Commented [CC26]:** What is the industrial density in this area relative to the county itself?

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*Some Monitoring Data Was Not Useful for Health Determinations*

Many organizations worked to collect information in real time, but much of that data was not used by TCEQ to make health-based decisions for quality control-related reasons. Data collected by the EPA's ASPECT emergency monitoring equipment, as well as data collected by contractors for an NGO, were not used in making health assessments related to air quality.

**Commented [CC27]:** Short or long-term based decisions?

**Commented [CC28]:** Ambient air quality?

Although the EPA's TAGA operation was primarily intended to screen for elevated air toxic concentrations, its data was also compared against AMCV thresholds for making health determinations. This comparison was presented to the public via a press release as not indicating levels of concern for the community.

**Commented [BA29]:** May need to be re-stated. Health exposure determinations or something similar?

Although the EPA's TAGA operation was primarily intended to screen for elevated air toxic concentrations, its data was also compared against AMCV thresholds for making health determinations. This comparison was presented to the public via a press release as not indicating levels of concern for the community. Under contract with the NGO Environmental Defense Fund, a private firm—Entanglement Technologies—supported the assessment of air quality following Hurricane Harvey's landfall by using a handheld monitor, their efforts beginning on September 4, 2017, and ending on September 9, 2017.

**Commented [CC30]:** The Agency has no control over an NGO's activities. This highlights potential problems with government use of non-government data in decision making.

**Commented [CC31]:** Vastly different technology than the TAGA.

ASPECT data was intended for screening purposes and not used for health determinations because the monitoring method (i.e., remote sensing) does not provide data with sufficient reliability to use in health determinations. As a part of this screening process, the EPA dispatched follow-up ground monitoring units and established evacuation zones as necessary to protect human health when elevated pollutant concentrations were detected. This occurred, for example, on September 2, 2017 when ASPECT detected benzoyl peroxide concentrations above the technology's method detection limit (MDL).

*Guidance Lacking to Help Plan Air Quality Monitoring Efforts in Response to an Emergency*

Emergency air monitoring efforts were initiated without an ambient air monitoring plan to help guide and coordinate air monitoring efforts, including, as discussed above, the minimum level of quality assurance needed to obtain data suitable for health risk determinations, and how to share data among all interested parties in a useful way.

While many entities collected air monitoring data in the weeks following the hurricane's landfall, the data acquisition was not performed in a manner that would provide a holistic picture of air quality in the Houston region. First, despite Entanglement Technologies and the City of Houston's efforts to share information and data with TCEQ, TCEQ did not forward these raw datasets to the EPA. We also found no evidence that the raw data was shared with the public. Second, raw data collected by the EPA via TAGA was stored in the Environmental Response Team's (ERT) Information Managment System, a data repository that can only be accessed by ERT staff. Finally, the EPA's ASPECT flight data was retained in the Environmental Unit of EPA's Office of Emergency Management, with its HAP concentration values stripped from the dataset. Although the EPA presented some preliminary analyses of data received, the EPA's raw data was never distributed to the public for review.

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Even if each of these monitoring datasets were housed in a central database accessible to all interested parties, the unique formatting of each individual dataset would have presented substantial challenges in data interpretation. For example, ASPECT's concentration values were split into 97 Excel Spreadsheets, requiring hours of reformatting to properly review the data. Furthermore, we found an inconsistent use of units for concentration values, which included parts per million, parts per billion, milligrams per cubic meter and micrograms per cubic meter.

The EPA lacks both internal and external guidance on appropriate methods for collaborating with others in the collection, assessment, and storage of ambient air quality data during extreme weather events or other emergency situations. Although EPA Region 6 and TCEQ collaborate for annual hurricane planning and training, this training does not include how to conduct or plan air quality monitoring during an emergency response. A focus on air quality monitoring in disaster planning for industrial cities like Houston would enable the use of pre-planned alternative monitoring devices in the future.

... Although EPA Region 6 and TCEQ collaborate for annual hurricane planning and training, this training does not include how to conduct or plan air quality monitoring during an emergency response. A focus on air quality monitoring in disaster planning for industrial cities like Houston would enable the use of pre-planned alternative monitoring devices in the future.

**Commented [CC32]:** Good example of how emergency response air data was useful for supporting public health decisions by local authorities. Please note that EPA does not have any authority to establish evacuation zones. EPA only advises local and state officials who hve the authority to establish evac zones.

**Commented [CC33]:** It is confusing to compare emergency air monitoring with ambient air monitoring. The two types of monitoring have different purposes.

**Commented [CC34]:** Ambient air monitoring data or emergency response air monitoring data? Or both?

**Commented [CC35]:** The purpose of emergency response air monitoring is to provide a localized, immediate picture of imminent threats not to provide an holistic picture of air quality in a region.

**Commented [CC36]:** Unclear as to what distribution of raw data to the public during the emergency response phase would accomplish in terms of communicating risk. Based on time constraints, seems like the public would benefit more from press releases based on data summaries by scientists.

**Commented [CC37]:** See statement above regarding release of raw data versus summaries of evaluated data by Agency scientists.

**Commented [BA38]:** Should not this collaboration also include local county and municipal agencies given their own involvement while state and federal are also involved in the same space?

**Commented [CC39]:** Ambient air quality monitoring?

**Draft Recommendations for Discussion**

We recommend the Deputy Administrator for the Office of Emergency Management:

1. Develop and implement air quality emergency monitoring guidance for use in emergency responses in heavily industrialized areas. This guidance should address topics such as how to select monitoring locations, the duration and timing of monitoring, and the appropriate monitoring methods to use dependent on the intended use of the data.

2. Develop and implement a method for storing and providing access to ambient air monitoring data collected during an emergency response.

3. Test and evaluate the use of low-cost air monitors throughout fence-line communities to conduct air toxics and other monitoring during emergency situations when permanent air monitors are not operational.

**Commented [CC40]:** Ambient air quality?

**Commented [CC41]:** During the event or after it?

**Commented [CC42]:** The access and/or infrastructure may not exist during the initial stages of an emergency response to support any kind of fence line monitoring.

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There are limitations to a state by state approach to determining margins of safety, however. A comparison of the AMCVs to California's ambient air quality thresholds highlights that there is a distinction between Texas and California's air toxic exposure guidelines, and it is likely that a review of other state guidelines will also show differences. This suggests that the lack of standardization in air toxic thresholds may cause the Agency to provide inconsistent advice as it supports local entities in disasters. For example, the EPA may advise local governments to issue a shelter in place order for a fence-line community due to a benzene concentration of 0.1 ppm in California where the acceptable concentration is set to 0.01 ppm. The EPA, however, would not regard this same concentration as a threat to public health in Texas where the acceptable concentration is set to 0.18 ppm.

**Commented [CC43]:** Not clear why EPA would advise a shelter-in-place order based on exceedance of an ambient air quality standard or a standard based on chronic threat.

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**Draft Recommendations for Discussion**

We recommend the Deputy Administrator for the Office of Air and Radiation

1. Develop and implement a method to account for excess emissions events when conducting national assessments of health risk from exposure to air toxics.

We recommend the Deputy Administrator for the Office of Land and Emergency Management

2. Identify and standardize the use of appropriate health-based ambient air quality thresholds in communities during emergency responses.

**Commented [CC44]:** Ambient air quality is the responsibility of the Office of Air and Radiation.

We recommend that the EPA Region 6 Administrator

3. Develop and implement a plan for limiting residential exposure in communities that face elevated health risks from chronic, multiple-pollutant exposures to SSM emissions during a large-scale emergency requiring widespread facility shutdown and subsequent startups.

**Commented [CC45]:** The Agency cannot predict nor control the SSM activities of facilities. In addition, there may be far more pressing emergencies that take priority for limited response resources such as tank explosions, pipeline breaks, etc.

**Issue 3: While No Instances of Inaccurate Communication Were Identified, Communication Overall Was Lacking with Respect to Issue Resolution and Monitoring Results**

We did not identify any instances of inaccurate communication regarding air quality after the Hurricane Harvey. However, communication was limited with respect to informing residents of air monitoring results and in addressing or resolving concerns that residents brought to the attention of the EPA. Several factors contributed to information not reaching impacted communities. As a result, communities were left unaware on important issues, which can result in a lack of trust in the EPA's actions and findings.

**Commented [CC46]:** In comparison to?

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*Guidance for Community Engagement During an Incident*

……..

The Hurricane Harvey response was the first instance in which so many liaisons were utilized by the agency. The community liaisons conducted a significant amount of outreach with communities, had daily meetings with the community liaison lead in Superfund, and had a dedicated EJ email address that the community could use. Particularly in the Port Arthur/Beaumont area, the community liaisons played an active and present role in the affected community.

**Commented [BA47]:** And in the Houston area

*Controls Lacking to Assure Community Concerns Were Addressed*

The EPA lacked an established channel by which information reaches back to the community after resolution and EPA staff were unaware of the CCP. While response activities were reported to EPA Headquarters daily, community liaisons and field staff reported in the post-hurricane surveys that

**Commented [BA48]:** Should say lacked an effective channel by which….EJ held weekly calls with stakeholders providing feedback; however, that established effort can and should be improved

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We identified some concern among regional staff and managers that information did not reach all vulnerable communities as some residents were not aware of the EPA's presence in these communities. We confirmed with some community members that, …

**Commented [BA49]:** Regional staff did reach local (county and municipal) points of contacts, relying on this medium for extending transfer of information…that said, this coordination can and should be improved

**Draft Recommendations for Discussion**

We recommend the Deputy Administrator for the Office of Emergency Management

1. Within the Crisis Communication Plan:

    a) Establish a feedback loop between the EPA to communicate issue resolution information to affected communities.
    b) Develop and implement a strategy for public dissemination of air quality data.

**Commented [CC50]:** What is the role of the State in this loop since they initiate requests to FEMA for assistance?

We recommend the Region 6 Regional Administrator:

2. Include outreach to environmental justice communities into planning and pre-landfall exercises by determining during hurricane preparation what these communities will specifically need in terms of both physical support and linguistic requirements, so EPA staff are ready during response.

**Commented [CC51]:** Does this recommendation assume the State will request this assistance?